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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/723,216	11/26/2003	Takehisa Takoshima	02008.134001	2554

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EXAMINER	
CAZAN, LIVIUS RADU	
ART UNIT	**PAPER NUMBER**
3729	

DATE MAILED: 10/23/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/723,216	TAKOSHIMA ET AL.	
	Examiner	Art Unit	
	Livius R. Cazan	3729	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *21 September 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-5,7-10 and 12-18* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-5,7-10 and 12-18* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *21 September 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. The amendment filed on 9/21/2006 has been fully considered and made of record. Cancellation of claims 6 and 11 is acknowledged. The various objections to the specification and drawings as well as the rejection under 35 U.S.C. 112 have been overcome at least in part (see the new issues bellows). However, the specification still contains numerous grammatical errors, and therefore the objection to the specification is maintained in part. For example, in paragraph [0034], line 9, "that the join of the holding" is incorrect. Likewise "XeF2" in paragraph [0036] and "it is possible to allowing" (page 13, para. [0040], ln. 7) are incorrect. Applicant is asked to carefully re-read the specification and correct *all* informalities, not only those given as examples by the examiner.

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 8 and 14-18 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The phrase "said divided probe..." lacks proper antecedent basis in each of these claims. For examination purposes, the step of dividing is considered to be performed in each of these claims.

Claim Rejections - 35 USC § 103

4. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

5. Claims 1-5, 7, 8, 10, and 12-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Khandros (WO/1997/044676 to Khandros et al.) in view of Shimokohbe (JP2000317896, with US6406637 to Shimokohbe et al. being used as an English language equivalent).

Khandros discloses:

- Preparing a probe pin forming substrate (202 in Figs. 2A-2J and the figure below) for forming a plurality of probe pins, as per claim 1 (see Figs. 5 and 6. see section "Probe Applications", pp. 36-38), by forming a probe pin groove part (see Figs. 2A-2J; see region comprising portions B, C, and D in the figure below) having a bottom surface (B below) substantially parallel to a surface (A below) of said probe pin forming substrate and an inclined surface (C below) having a first end (C1 below) extending from said bottom surface (B) and forming an angle with the bottom surface (B) and a second end (C2 below) extending from said surface (A below) of the probe pin forming substrate (202 below), as per claim 2; the protrusion forming groove part is formed using anisotropic etching (clearly, from Figs. 2A-2J, the etching is anisotropic; see section "Fabricating the Contact Structure", pp. 21-30, in particular ln. 4 on page 24), as per claim 3
- Forming an alloy layer (alloy layer 256 in Fig. 2H; see page 28, lns. 10-15) deposited from the bottom surface (B below) over the inclined surface (C below) and said surface (A below) of the probe pin forming substrate (202), as per claim 1; a protrusion forming groove part (D) is also formed

at an area where the alloy layer is formed on the bottom surface, as per claim 4, and alloy is formed at said protrusion forming groove part (see Fig. 2H); a conductive layer may also be formed over the alloy layer, as per claims 5 and 10 (see conductive layers 254 and 252 in Fig. 2H)

- Preparing a holding substrate (electronic component 408, Figs. 4A-4C) for holding the alloy layer, the holding substrate comprising a transfer line (terminals 406, Figs. 4A-4C) for transferring a signal, as per claim 1
- Dividing the alloy layer into portions corresponding to individual probe pins as per claims 8 and 13-18 (see page 29, lns. 15-30)
- Forming a joining member for joining the alloy layer and the transfer line, as per claims 7 and 12 (see stud 472 in Fig. 4E)
- Joining a part of the amorphous alloy layer and the transfer line, as per claim 1, or joining the amorphous layer and the transfer line, as per claims 7, 8, and 12-18 (see page 32, lns. 5-15; clearly, soldering/brazing involves heating); note that soldering is performed at temperatures below 450°C and brazing at temperatures above 450°C (see "Soldering" and "Brazing" references)
- Removing at least a part of the probe pin forming substrate , as per claim 1 (see section "Removing the Sacrificial Substrate", pp.30-31; see page. 32, lns. 30-32); note that chemical etching is performed at a relatively low temperature, such as 80°C for example (see col. 6, lns. 35-40 and col7, lns. 25-30 of Shimokohbe)

Khandros does not disclose the use of an alloy that is amorphous and has a supercooled temperature range and heating the amorphous alloy layer to the temperature range for which the amorphous alloy layer is a supercooled liquid, followed by cooling to a temperature below the supercooled liquid range, as in claim 1.

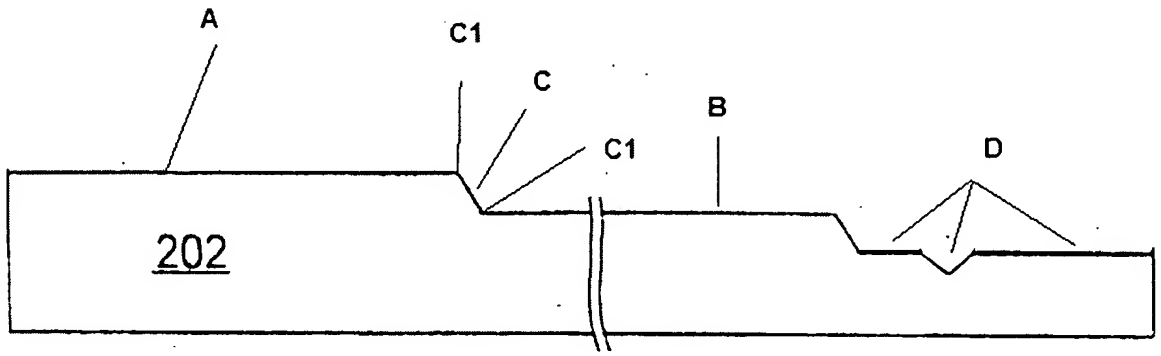
Shimokohbe teaches the use of amorphous alloys of metallic glass (TMFG) to form microstructures such as micro beams (i.e. probe pins). In order to decrease internal stress present in the micro beams due to the deposition process (i.e. sputtering), they are heated to the supercooled liquid state and thereafter cooled to a temperature lower than the supercooled liquid state, so as to remove internal stress (see Abstract; see col. 2, lns. 5-57; col. 4, lns. 55-65).

Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to employ an amorphous alloy as taught by Shimokohbe and to heat it to a temperature range for which the amorphous alloy is a supercooled liquid, and thereafter cool it below this temperature, in order to remove internal stress from the alloy material, as taught by Shimokohbe.

Note that Shimokohbe specifies that amorphous materials having a glass transition temperature between 200 and 600°C as being suitable, with a supercooled temperature range of at *least* 20°C, meaning a supercooled temperature range extending at least from between 200-220°C to between 600-620°C. As discussed above, Khandros discloses employing either soldering or brazing to join the amorphous alloy layer to the transfer line, and both of these processes employ high temperatures both below and above 450°C, clearly a substantial overlap with the supercooled liquid

temperature range and therefore Khandros discloses performing the joining at a temperature in the supercooled temperature range.

Also note that Khandros employs chemical etching to remove part of the substrate, as discussed above, and this is performed at a temperature much lower than a temperature range for which an amorphous alloy layer such as that disclosed by Shimokohbe would be in a supercooled liquid state.



6. Claim 9 is rejected under 35 U.S.C. 102(b) as being anticipated by Hata et al. ("Fabrication of Thin Film Metallic Glass and its Application to Microactuator"; hereinafter "Hata").

Hata discloses:

- forming an amorphous alloy layer (TFMG, Fig. 4(4)) of a predetermined shape on a probe pin forming substrate (substrate in Figs. 4(1)-4(3)) for forming said probe pin, wherein said amorphous alloy layer has a temperature range for which said amorphous alloy layer is a supercooled liquid

- heating said amorphous alloy layer at said temperature range for which said amorphous alloy layer is a supercooled liquid (Fig. 4(5); page 101, lns. 1-4)
- cooling said amorphous alloy layer (page 101, ln. 4; cooling to 323K)
- removing at least a part of said probe pin forming substrate in a state where said amorphous alloy layer is cooled at a temperature lower than said temperature range for which said amorphous alloy layer is a supercooled liquid (Fig. 4(6); page 101, ln. 5)
- reheating said amorphous alloy layer at a temperature for which said amorphous alloy layer is a supercooled liquid (abstract, lns. 6 and 7; straight beams obtained in Fig. 4(6) were re-heated to the supercooled liquid state)

Response to Arguments

7. Applicant's arguments with respect to claims 1-8 and 10-18 have been considered but are moot in view of the new ground(s) of rejection.

However, regarding Applicant's assertion (pages 18 and 19) that "Khandros is directed to, for example, soldering, which is completely irrelevant to a temperature range for which said amorphous alloy layer is the supercooled liquid", Applicant's attention is directed to the rejection of claim 1 above. As stated in the rejection, both soldering and brazing are indeed applicable to the temperature range for which the amorphous alloy is a supercooled liquid, since temperatures below and above 450°C are employed during these joining processes. Moreover, Applicant's attention is directed

to paragraphs [0034] and [0035] of the present specification. In the embodiment of para. [0034], the Applicant states "In addition, the thermal compression bonding [i.e. the joining step] is preferably performed at a temperature at which the amorphous alloy layer is *not* heated to the supercooled liquid temperature area." (lns. 11-13). In the embodiment of paragraph [0035] (as amended) the Applicant states "In addition, the holding end part 24 may be bonded to the transfer line 64 by thermal compression by heating at the temperature range for which said amorphous alloy is a supercooled liquid." (lns. 2-6). Clearly, it is not critical to the invention whether or not the joining is performed at a temperature for which the amorphous alloy is a supercooled liquid.

8. Applicant's arguments filed 9/21/2006 with respect to claim 9 have been fully considered but they are not persuasive. Applicant argues (see pages 16 and 17) that "Hata does not show or suggest 'at least reheating said amorphous layer at a temperature range for which said amorphous alloy layer is [a] supercooled liquid.'" As carefully articulated in the rejection of claim 9 above, Hata forms micro beams (i.e. probes) by sputtering an amorphous alloy layer on a substrate. This produces bent beams, which are heated to a temperature at which the alloy is a supercooled liquid, thereby relaxing the stress in the beams and forming straight beams, and the temperature is reduced below the glass transition temperature. The substrate is then removed by etching. According to the abstract, the straight beams are then re-heated to a temperature at which the amorphous alloy is a supercooled liquid, so as to produce bent beams. Therefore claim 9 is anticipated by Hata.

Conclusion

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Livius R. Cazan whose telephone number is (571) 272-8032. The examiner can normally be reached on 7:30AM-4:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Peter Vo can be reached on (571)272-4690. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

LRC 10/06/2006

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